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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,514	03/22/2004	Wilhelm Frohs	SGL 02/23	3892

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EXAMINER	
DESAI, ANISH P	

ART UNIT	PAPER NUMBER
1771	

DATE MAILED: 07/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/806,514	FROHS ET AL.	
	Examiner	Art Unit	
	Anish Desai	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-18* is/are pending in the application.

4a) Of the above claim(s) *9-18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2&4-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

The applicant's arguments in response to the Office action dated 02/09/06 have been fully considered.

1. Claims 1-2 and 4-18 are pending, claims 9-18 are withdrawn, claim 3 is cancelled, and claims 1 and 9 are amended.

2. The art rejections of Chuoku (GB 1548046) are maintained.

3. A new ground of rejection is made in view of Mochida et al. (US 5,205,888).

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

In this office action, the recitation "for carbon material electrode" in the preamble of claim 1 is directed to intended use of the claimed product. Note that the claim preamble must be read in the context of the entire claim. The determination of whether preamble recitations are structural limitations or mere statements of purpose or use "can be resolved only on review of the entirety of the [record] to gain an understanding

of what the inventors actually invented and intended to encompass by the claim." Corning Glass Works, 868 F.2d at 1257, 9 USPQ2d at 1966. If the body of a claim fully and intrinsically sets forth all of the limitations of the claimed invention, and the preamble merely states, for example, the purpose or intended use of the invention, rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction. Pitney Bowes, Inc.v. Hewlett-Packard Co., 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165 (Fed. Cir.1999). See also Rowe v. Dror, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997) ("where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention, the preamble is not a claim limitation"). MPEP 2111.02. Thus, the recitation "for carbon material electrodes" has not been given any patentable weight.

4. Claims 1,4, and 5 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chuoku (GB 548046) substantially as set forth in 02/09/06 Office action.

With respect to claim 1, Chuoku discloses carbon electrodes with a high strength and spalling resistant for electrical furnaces wherein iron, steel and alloys are manufactured (Front page, lines 9-14) and a method of preparing carbon electrodes (Page 2, lines 42-44). The method of making the electrode comprises a mixture containing carbonaceous material such as petroleum coke, polyacrylonitrile based non-fusible fibers that are oxygenated (Page 2, lines 45-51, lines 103-106, 113-121), and a binder such as coal tar pitch (Page 3, lines 92-93). Chuoku further discloses a mixture

comprising non-fusible fibers, carbonaceous material, and a binder wherein the mixture is shaped and backed to carbonize the non-fusible fibers simultaneously with the carbonization of the carbonaceous material and the binder (Page 4, lines 34-37). The examiner is equating the coal tar pitch binder as the claimed carbonized coating. Additionally, Chuoku teaches the carbon fibers produced by the carbonization of the non-fusible fibers wherein the carbon fibers are securely bonded to the surrounding material present in the shaped body, thus yielding high-strength carbon electrodes (Page 4, lines 44-49). Thus, the carbon fibers are present in the electrode of Chuoku. The term "carbon electrodes" also means electrode bodies and nipples (Front page, lines14-17). Regarding claim 4, the length of the fiber discloses by Chuoku is 1-25 mm (Page 2, lines 45-47). With respect to claim 5, Chuoku teaches that the addition of non-fusible fibers in the amount of from 0.5 to 5% by weight (Page 3, line 79-80). Regarding claim 7, as stated above Chuoku discloses polyacrylonitrile based carbon fibers.

Although Chuoku does not teach explicitly teach the carbon fibers have a linear coefficient of thermal expansion of from –0.5 to +0.1 μm/(K*m) in a direction parallel to a lateral surface thereof, and from 1.7 to 2.1 1 μm/(K*m) in a normal plane orthogonal thereto, however it is reasonable to presume that the carbon fibers of Chuoku have a linear coefficient of thermal expansion of from –0.5 to +0.1 μm/(K*m) in a direction parallel to a lateral surface thereof, and from 1.7 to 2.1 1 μm/(K*m) in a normal plane orthogonal, because like material has like property. The applicant is using polyacrylonitrile (PAN) based carbon fibers page 11, Specification). Chuoku also teaches the use of non-fusible organic fibers that are converted to the carbon fibers.

The non-fusible fibers of Chuoku are produced from polyacrylonitrile (Page 2, lines 103-106 and lines 114-117). Thus, the carbon fibers in the final product of Chuoku are similar to the carbon fibers of the applicant. Therefore, the presently claimed properties of the carbon fibers with a linear coefficient of thermal expansion of from –0.5 to +0.1 μm/(K*m) in a direction parallel to a lateral surface thereof, and from 1.7 to 2.1 1 μm/(K*m) in a normal plane orthogonal thereto would have been inherently present. See *In re Fitzgerald* 205 USPQ 594. In addition, the presently claimed property of coefficient of thermal expansion would obviously have been present once the carbon electrode of Chuoku is provided. Note *In re Best*, 195 USPQ at 433, footnote (CCPA 1977) as to the providing of this rejection made above under 35 USC 102. Accordingly, Chuoku anticipates or strongly suggests the claimed subject matter.

5. 1,4,7, and 8 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mochida et al. (US 5,205,888).

Mochida teaches a process for making carbon fiber reinforced materials. The process includes a step of impregnating a carbon fiber assembly with a melt of mesophase pitch or mixing short carbon fibers with the mesophase pitch, shaping the pitch-impregnated assembly or pitch/short carbon fiber mixture, and firing the same (abstract). Additionally, the carbon fiber assembly of Mochida is subjected to a preliminary surface treatment such as oxidation (column 3,lines 1-3). The carbon fiber assembly of Mochida reads on claimed connecting piece body. The examiner is interpreting "a connecting piece body" as recited in claim 1 as any article comprising carbon fibers will read on "a connecting piece body". According to Mochida, another

requirement that should be met by the mesophase pitch for use in the present invention is that it achieves a carbonization yield of at least 70%, preferably at least 80%, when it is gradually heated to a temperature of about 600.degree. C. in an inert gas stream and thereafter held at that temperature for about 2 hours. The use of this mesophase pitch having high carbonization yield contributes to less evaporation of volatile matter during carbonization and, hence, the carbon bonds formed are dense and leave practically no voids behind, thereby leading to the formation of an extremely rugged optical anisotropic phase. On the other hand, if pitch having low carbonization yield is used, voids are more likely to form in the shaped product on account of evaporating gases and the carbon fiber reinforced carbon material obtained, as the final product will have an insufficient mechanical strength (column 3,lines 38-55).

Further, Mochida teaches the carbon fiber assembly to be used in the present invention is formed of various kinds of carbon fibers including PAN (column 2,lines 61-63) and the carbon fiber assembly may be a web of unidirectional fibers, a two-dimensional woven fabric or nonwoven fabric sheet. Two or more of these assemblies may be combined (column 2,lines 63-66). Additionally, the carbon fiber length is variable from 50 μm to 10 mm depending on the use of the final product and on the specific characteristics required (column 3, lines 7-8).

Although Mochida does not teach explicitly teach the carbon fibers have a linear coefficient of thermal expansion of from –0.5 to +0.1 μm/(K*m) in a direction parallel to a lateral surface thereof, and from 1.7 to 2.1 1 μm/(K*m) in a normal plane orthogonal thereto, however it is reasonable to presume that the carbon fibers of Mochida have a

linear coefficient of thermal expansion of from –0.5 to +0.1 μm/(K*m) in a direction parallel to a lateral surface thereof, and from 1.7 to 2.1 1 μm/(K*m) in a normal plane orthogonal, because like material has like property. The applicant is using polyacrylonitrile (PAN) based carbon fibers (page 11, Specification) that are oxidatively activated. Mochida also teaches use of PAN based carbon fibers that are subjected to a preliminary surface treatment such as oxidation. Thus, the carbon fibers of Mochida are similar to the carbon fibers of the applicant. Therefore, the presently claimed properties of the carbon fibers with a linear coefficient of thermal expansion of from –0.5 to +0.1 μm/(K*m) in a direction parallel to a lateral surface thereof, and from 1.7 to 2.1 1 μm/(K*m) in a normal plane orthogonal thereto would have been inherently present. *In re Fitzgerald* 205 USPQ 594. In addition, the presently claimed property of coefficient of thermal expansion would obviously have been present once the carbon electrode of Chuoku is provided. Note *In re Best*, 195 USPQ at 433, footnote (CCPA 1977) as to the providing of this rejection made above under 35 USC 102. Accordingly, Mochida anticipates or strongly suggests the claimed subject matter.

6. Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chuoku (GB 1548046) in view of *Handbook of Carbon, Graphite, Diamond and Fullerenes – Properties, Processing and Applications* (see, Chapter 8, Table 8.6, Page 191) substantially as set forth in the 02/09/06 Office action.

The invention of Chuoku as applied to claim 1 is previously disclosed. Although Chuoku is silent with respect to teaching the claimed modulus, the PAN fibers with the claimed modulus are well known in the art as shown in the *Handbook of Carbon,*

Graphite, Diamond and Fullerenes – Properties, Processing and Applications (see, Chapter 8, Table 8.6, Page 191). Thus a skilled artisan would have found it obvious to use the carbon fibers having the claimed modulus in the mixture of Chuoku to form the electrodes having excellent strength.

Regarding claim 6, Chuoku discloses the claimed invention except that the mass fraction of the coating on the carbon fibers, based on the mass of the carbon fiber is from 0.2 to 15%. Note that the mass fraction of the coating is considered as a result effective variable. As the amount of coating increases, the mass fraction of the coating on the carbon fiber increases which results in a stronger adhesion of the carbon fiber with the matrix. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the claimed mass fraction, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. Since the applicant has not contested this position of the examiner, it is taken as concession.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chuoku (GB 1548046) in view of Lewis et al. (US 5,413,738) substantially as set forth in 02/09/06 Office action.

The invention of Chuoku is previously disclosed. Chuoku is silent as to teaching of disposal of the carbon fibers in the form as claimed in the claim 8. However, Lewis teaches a unitary composite structure having improved flexural strength and a reduced coefficient of thermal expansion comprising combination of carbonaceous reinforcing materials interbonded with pitch (see abstract). Additionally, Lewis teaches that their

invention is applicable in the field of carbon-carbon composites and is most applicable to graphite electrodes (Column 1, lines 10-15). The fibers used for the carbonaceous reinforcing material may be woven, non-woven or knitted (Column 13, lines 1-5). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the carbon fibers of Lewis et al. in the form of woven, non-woven or knitted and used it in the invention of Chuoku, motivated by the desire to obtain a carbon electrode with the improved properties such as flexural strength and reduced coefficient of thermal expansion.

Response to Arguments

8. Applicant's arguments filed on 06/08/06 have been fully considered but they are not persuasive.

Applicants do not agree with the examiner's opinion regarding transforming the surface of the formed fibers in the material and the effect to the resulting product. In support the applicant has asserted that in the example 5 of Chouku the bending strength is 28.45 MPa (290 Kg/cm^2) with a fiber content of 3 wt% compared to the example 2 of the claimed invention in which a bending strength of 28.5 MPa was found by addition of 2.3 wt% oxidation treated and coated carbon fibers. Additionally, it seems that the applicant has somehow correlated the bending strength to the coefficient of thermal expansion and has asserted that Chouku does not anticipate or suggest the claimed coefficient of thermal expansion. The examiner respectfully disagrees. Note that in order to make the convincing unexpected result arguments, the bending strength of the sample of the shaped carbon bodies of Chouku and the bending strength of the

sample of the applicant's connecting piece should be measured by the same method. The applicant has not provided any factual evidence that would indicate that the bending strength as disclosed in the example 5 of Chouku and the bending strength of the sample in the example 2 of the presently claimed invention are measured by the same method. The specification of the presently claimed invention does not seem to indicate how the bending strength was measured. Additionally, note that the diameter (10 in = 1500 mm) and the length (1500 mm) of the sample used in the bending strength measurement in the example 5 of Chouku is significantly different from the diameter (305 mm) and the length (2300 mm) of the applicant's sample for which the bending strength is measured. Thus, it is the examiner's position that the amount of fibers cannot be the only variable affecting the bending strength. Further, regarding applicant's arguments about coefficient of thermal expansion, it is not clear to the examiner as to what applicant is attempting to convince by correlating the bending strength data to the coefficient of thermal expansion. Accordingly art rejections are sustained. Regarding the dependent claims 2 and 4-8, although the applicant has generally traversed the examiner's rejection with respect to said dependent claims but not explicitly pointed out supposed errors in the rejection, therefore it is taken that there is a concession with the examiner's position.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anish Desai whose telephone number is 571-272-6467. The examiner can normally be reached on Monday-Friday, 8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on 571-272-1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

APD

Hai Vo

HAI VO
PRIMARY EXAMINER